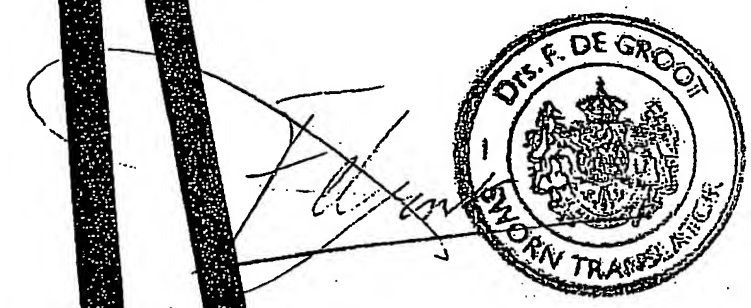
CERTIFICATION

I, drs. F. de Groot, a sworn translator of Dutch nationality, of J. Boezerstraat 83, 2552 DL DEN HAAG, the Netherlands, do hereby declare that, to the best of my knowledge and belief, the attached translation prepared by me is a complete and accurate translation of the text of German Offenlegungsschrift DE 42 41 074 A1, also attached.

Signed this 22nd day of May, 2006



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- translation -

German Offenlegungsschrift DE 42 41 074 A1 (Satzinger GmbH & Co.)

Title: Lubricant dispenser with mechanism for dosed lubricant release, and method for operation of such a lubricant dispenser

Abstract

Lubricant dispenser with mechanism for dosed lubricant release. In its basic construction, the lubricant dispenser consists of a lubricant reservoir which has a lubricant release opening, a dosing piston movable in the lubricant reservoir, a pressure gas cartridge with pressure gas outlet and a diffusion choke. The pressure gas cartridge acts via the pressure gas outlet on the diffusion choke. The diffusion choke is in communication with the space above the dosing piston through a gas pressure inlet. Also specified is a method for the operation.

Description

The invention concerns a lubricant dispenser with mechanism for dosed lubricant release, - with lubricant reservoir, which has a lubricant release opening, and dosing piston movable in the lubricant reservoir. The dosing piston in such lubricant dispensers is loaded by the pressure of a pressure gas. The pressure and the volume of the pressure gas determine the dosing, expressed more precisely, the lubricant release rate, by which is meant the lubricant mass released in the time unit. - Required in practice are such lubricant dispensers with a guaranteed service life of six to twelve months and more, and at a very precise lubricant release rate throughout the service life.

Lubricant dispensers having the described construction and the described function are known in various embodiments. Known, for instance, are lubricant dispensers with integrated electrolytic cells, where the electrolytic action is employed for generating the pressure gas and the thus generated pressure gas determines the lubricant release rate (cf. DE 42 09 776 A1). The known measures have proven themselves, but are complex, costly and, depending on the construction of the electrolytic cell, require special disposal after use.

The object of the invention is to provide a lubricant dispenser of the initially described construction and of the initially described purpose, which operates without electrolytic cell.

To solve this problem, the subject matter of the invention is a lubricant dispenser with mechanism for dosed lubricant release, - with

lubricant reservoir, which has a lubricant release opening,
dosing piston movable in the lubricant reservoir,
pressure gas cartridge with pressure gas outlet and
diffusion choke,

wherein the pressure gas cartridge acts via the pressure gas outlet on the diffusion choke, and the diffusion choke is in communication with the space above the dosing piston via a pressure gas inlet. – The expression diffusion choke denotes a choke element to which apply not the laws of aerodynamics or more generally gas dynamics, but the diffusion limit. Diffusion denotes, as is generally known, a physical equilibrium process in the course of which particles (atoms or molecules in the context of the invention), as a result of their thermal movement, proceed via irregular zigzag paths from places of higher concentration to places of lower concentration, gradually resulting in a density or concentration equilibrium. In the context of the invention, it is possible to work with any pressure gases; gases which have proven themselves are elemental gases, as for instance nitrogen or helium. However, it would also be possible to work with air. It is understood that also hydrogen could be employed as pressure gas, which, however, because of the hazard of hydrogen in many cases is not recommendable. Diffusion chokes have pores allowing an equilibratory action in the manner described. The diffusion chokes can for instance be designed as diaphragms from plastic or also embodied as sintered ceramic components.

The invention is based on the insight that a diffusion choke employed as described effects a lubricant release from the lubricant dispenser for long and very long periods of time, more specifically such that throughout the service life the release of a small and also very small lubricant release rate can be ensured, and with a high accuracy.

In detail, there are several possibilities of the further construction and design of a lubricant dispenser according to the invention. Thus, the pressure piston can be designed as a piston rigid under the operating conditions and be guided in the lubricant reservoir as a cylinder. It is also possible, however, to design the dosing piston as a diaphragm piston, also in the form of a piston bladder, and to adapt the diaphragm piston to be pressable, under diaphragm deformation, into the lubricant reservoir. In this way too, the free volume in the lubricant reservoir decreases, and commensurately with this decrease the dosed release of the lubricant proceeds.

In general, the pressure gas cartridge will be exchangeably attached to the lubricant reservoir, allowing several pressure gas cartridges to be used during the service life of a lubricant dispenser according to the invention. It is understood that the pressure gas cartridges are of such design that they

must be opened after being fitted on the lubricant reservoir. To that end, numerous possibilities are known in the art.

Within the framework of the invention, the diffusion choke can be arranged in the pressure gas outlet of the pressure gas cartridge. This is recommendable in particular when the pressure gas cartridge is exchangeable in the manner described. However, there is also the possibility of arranging the diffusion choke in a pressure gas inlet of the lubricant reservoir.

Within the framework of the invention, there are several possibilities of ensuring that a lubricant dispenser according to the invention throughout its specified service life works with a likewise specified lubricant release rate, which is maintained very accurately. A preferred embodiment of the invention is characterized in that for the pressure gas cartridge or the lubricant reservoir, respectively, a series of diffusion chokes are provided, exchangeably, and by assembling different diffusion chokes, the lubricant dispenser, prior to operative deployment, can be set for different lubricant release rates. Here the different diffusion chokes are provided with a different diffusion resistance, hence possess diffusion pores of different diameter and diffusion channels of different length. It is also possible, however, to change the active surface of the diffusion chokes commensurately with the pressure of the pressure gas in the pressure gas cartridge, which can change during the service life of a lubricant dispenser according to the invention. To that end, the invention teaches that the diffusion choke is designed as a disc choke, which is elastically deformable under the influence of the pressure of the pressure gas, and for the disc choke there is provided a hollow cone shaped choke seat with central pressure gas closure, from which the diffusion choke, as the pressure of the pressure gas from the pressure gas cartridge falls, comes off, under enlargement of the free choke surface. This can be tailored such that for the normal service life a very constant lubricant release rate is ensured. According to another proposal in this connection, the diffusion choke is designed as a hollow cylinder choke which is open on one side and equipped with a diffusion choke bottom on the other side, and piston-fashion plunges into a hollow cylinder receptacle against a resetting spring, whereby the pressure of the pressure gas presses the hollow cylinder choke into the hollow cylinder receptacle and, with decreasing pressure, the hollow cylinder choke, under the influence of the resetting spring, comes up out of the hollow cylinder receptacle, under enlargement of the choke surface. The enlargement of the choke surface effects a reduction of the choke resistance, can hence ensure a constant quantitative flow of the pressure gas as the pressure in the pressure gas cartridge falls.

As already mentioned, the diffusion choke can be designed as a diaphragm from plastic. But it can also be designed as a sintered ceramic component. It is understood that it is to be incorporated so as to be circumferentially appropriately tight, preferably diffusion-tight.

Subject matter of the invention is also a method for operating a lubricant dispenser of the construction described, wherein a pressure gas cartridge is employed, whose volume and whose pressure in the pressure gas are tuned to the volume of the lubricant reservoir, such that the pressure of the pressure gas in the pressure gas cartridge during the normal service life of the lubricant dispenser as determined by the volume of the lubricant reservoir, only changes inappreciably and that as a result a sufficiently constant lubricant release rate is set. In this manner of operation it is not required to design the diffusion chokes as elastically deformable disc chokes or hollow cylinder chokes which, in the manner described, with decreasing pressure of the pressure gas in the pressure gas cartridge, enlarge their choke surface.

In the following, the invention will be elucidated in more detail with reference to a drawing representing an embodiment by way of example only. In the drawing, in diagrammatic representation,

Fig. 1 shows a longitudinal section through a lubricant dispenser according to the invention,

Fig. 2 shows another embodiment of the subject matter of Fig. 2,

Fig. 3, in cutaway view, on a reduced scale with respect to Fig. 1, shows another embodiment of a lubricant dispenser according to the invention, and

Fig.4 shows once more, similarly to Fig. 3, a further embodiment.

The lubricant dispenser with mechanism for dosed lubricant release represented in the drawings consists, in its basic construction, of a lubricant reservoir 1, which has a lubricant release opening 2, a dosing piston 3 movable in the lubricant reservoir, a pressure gas cartridge 4 with pressure gas outlet 5 and a diffusion choke 6. It is understood that a lubricant diffuser or a spray needle may be connected to the lubricant release opening 2.

Essential to the invention is that the pressure gas cartridge 4 acts via the pressure gas outlet 5 on the diffusion choke 6, and the diffusion choke 6 is in communication with the space above the dosing piston 3 via a pressure gas inlet 7. In the embodiment according to Fig. 1, the dosing piston 3 is designed as a piston rigid under the operating conditions and guided in the lubricant reservoir 1 as a cylinder. In the embodiment according to Fig. 2, the dosing piston 3 is designed as a diaphragm piston in the form of a piston bladder. It is adapted to be pressed, under diaphragm deformation, into the lubricant reservoir 1, so that lubricant is expelled from the lubricant reservoir 1.

The pressure gas cartridge 4 is attached to the lubricant reservoir 1 so as to be regularly exchangeable. The diffusion choke 6 can be arranged both in the pressure gas outlet 5 of the pressure gas cartridge 4 and in a pressure gas inlet 7 of the lubricant reservoir 1. It is within the framework of the invention, in particular, for the whole arrangement to be such that for the pressure gas cartridge 4 and the lubricant reservoir, respectively, a kit of diffusion chokes 6 are provided, exchangeably, so that by assembling

different diffusion chokes 6 the lubricant dispenser, prior to operative deployment, is settable for different lubricant release rates.

In Fig. 3 it is indicated that the diffusion choke 6 is designed as a disc choke, which is elastically deformable under the influence of the pressure of the pressure gas. Arranged for the disc choke is a hollow cone shaped choke seat 8 with central pressure gas outflow 9, from which the diffusion choke 6, upon decreasing pressure of the pressure gas from the pressure gas cartridge 4, comes off under enlargement of the free choke surface. In this respect, the enlarged cross section in Fig. 3 shows different positions of the diffusion choke 6.

In the embodiment according to Fig.4, the diffusion choke 6 is designed as a hollow cylinder choke. On one side it is open and on the other side it is equipped with a diffusion choke bottom 10. It plunges into a hollow cylinder receptacle 11, piston-fashion, against a resetting spring 12. The arrangement is such that the pressure of the pressure gas presses the diffusion choke 6 into the hollow cylinder receptacle 11 and that upon decreasing pressure the diffusion choke 6, under the influence of the resetting spring 12, and under enlargement of the choke surface, moves up out of the hollow cylinder receptacle 11.

The diffusion chokes 6 involved may be such as are designed as plastic diaphragm, or such as are sintered ceramic components.

Claims

1. A lubricant dispenser with mechanism for dosed lubricant release, - with

lubricant reservoir, which has a lubricant release opening,
dosing piston movable in the lubricant reservoir,
pressure gas cartridge with pressure gas outlet and
diffusion choke,

wherein the pressure gas cartridge acts via the pressure gas outlet on the diffusion choke, and the diffusion choke is in communication with the space above the dosing piston via a pressure gas inlet.

2. A lubricant dispenser according to claim 1, wherein the dosing piston is designed as a piston rigid under the operating conditions and is guided in the lubricant reservoir as a cylinder.

3. A lubricant dispenser according to claim 1, wherein the dosing piston is designed as a diaphragm piston and the diaphragm piston can be pressed, under diaphragm deformation, into the lubricant reservoir.

4. A lubricant dispenser according to any one of claims 1 to 3, wherein the pressure gas cartridge is exchangeably attached to the lubricant reservoir.

5. A lubricant dispenser according to claim 4, wherein the diffusion choke is arranged in the pressure gas outlet of the pressure gas cartridge.

6. A lubricant dispenser according to any one of claims 1 to 4, wherein the diffusion choke is arranged in a pressure gas inlet of the lubricant reservoir.

7. A lubricant dispenser according to any one of claims 1 to 6, wherein for the pressure gas cartridge, or the lubricant reservoir, respectively, a kit of diffusion chokes are provided, exchangeably, and by assembly of different diffusion chokes the lubricant dispenser (prior to operative deployment) is settable for different lubricant release rates.

8. A lubricant dispenser according to any one of claims 1 to 7, wherein the diffusion choke is designed as a disc choke, which is elastically deformable under the influence of the pressure of the pressure gas, and wherein for the disc choke a hollow cone shaped choke seat with central pressure gas closure is arranged, from which choke seat the diffusion choke, with decreasing pressure of the pressure gas in the pressure gas cartridge, comes off under enlargement of the free choke surface.

9. A lubricant dispenser according to any one of claims 1 to 7, wherein the diffusion choke is designed as hollow cylinder choke, which on one side is open and on the other side is provided with a diffusion choke bottom and piston-fashion plunges into a hollow cylinder receptacle against a resetting spring, whereby the pressure of the pressure gas presses the hollow cylinder choke into the hollow cylinder receptacle and, upon decreasing pressure, the hollow cylinder choke, under the influence of the resetting spring, moves up out of the hollow cylinder receptacle under enlargement of the choke surface.

10. A lubricant dispenser according to any one of claims 1 to 9, wherein the diffusion choke is designed as a diaphragm from plastic.

11. A lubricant dispenser according to any one of claims 1 to 9, wherein the diffusion choke is designed as sintered ceramic component.

12. A method for operating a lubricant dispenser according to any one of claims 1 to 7, and one of claims 10 and 11, wherein a pressure gas cartridge is employed, whose volume and whose pressure in the pressure gas are tuned to the volume of the lubricant reservoir, such that the pressure of the pressure gas in the pressure gas cartridge during the normal service life of the lubricant dispenser as given by the volume of the lubricant reservoir only changes inappreciably and wherein as a result a sufficiently constant lubricant release rate is set.